

A new species of the genus *Rhodostrophia* Hübner, 1823 from Iran (Geometridae: Sterrhinae)

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Abstract. A new species of the Geometrid subfamily Sterrhinae is described from Iran: *Rhodostrophia tabestana* sp. n. The known distribution area of the species is restricted to high altitudes of the Zagros mountains. Details on the life history and on the habitat of the new species are given. In the context of the differential diagnosis the lectotype of *Rhodostrophia vastaria* (Christoph, 1877) is designated. *Rhodostrophia cauquenensis* (Butler, 1882) comb. n., *Rhodostrophia chilendaria* (Blanchard, 1852) comb. n. and *Rhodostrophia ferruginaria* (Blanchard, 1852) comb. n. from Chile are transferred to *Rhodostrophia* Hübner, 1823.

Zusammenfassung. Aus dem Iran wird eine neue Art aus der Geometriden-Unterfamilie Sterrhinae beschrieben: *Rhodostrophia tabestana* sp. n. Das bekannte Verbreitungsareal der Art ist auf die Höhenlagen des Zagros-Gebirges beschränkt. Angaben zur Lebensweise und zum Habitat der neuen Art werden gemacht. Im Rahmen der Differentialdiagnose erfolgt die Festlegung des Lectotypus für *Rhodostrophia vastaria* (Christoph, 1877), *Rhodostrophia cauquenensis* (Butler, 1882) comb. n., *Rhodostrophia chilendaria* (Blanchard, 1852) comb. n. und *Rhodostrophia ferruginaria* (Blanchard, 1852) comb. n. aus Chile werden nach *Rhodostrophia* Hübner, 1823 transferiert.

Introduction

The geometrid moth genus *Rhodostrophia* Hübner, 1823 belongs to the subfamily Sterrhinae and contains 72 described species (Scoble 1999), ranging from Europe, North Africa and the Arabian Peninsula to Taiwan, with a focus on the western and central Asian parts of the Palaearctic region. In addition, three previously unplaced species (Scoble 1999) from Chile can be combined with this genus, supported by the very similar habitus, quadripectinate antennae, very similar wing venation, unpaired proximal hindspurs and strikingly similar genitalic features, e.g. long uncus, multilobed tip of valva, curved aedeagus: *Rhodostrophia cauquenensis* (Butler, 1882) comb. n., *R. chilendaria* (Blanchard, 1852) comb. n. and *R. ferruginaria* (Blanchard, 1852) comb. n. The genus is defined by synapomorphic characters in wing venation, antennae and head; i. e. forewing usually with double areole, R_2 – R_4 stalked, R_5 from apex of second areole; hindwing with R_5 and M_1 shortly stalked, M_3 and CuA_1 usually separate; antennae of male long with four branches arising from each flagellomer ('quadripectinate'), with thin pectinations to tip; frons slightly convex, length of palpi equal to or slightly exceeding diameter of eye (Hausmann 2004; venation terminology after Scoble 1995). While preparing a revision of the genus *Rhodostrophia* of Iran and adjacent territories we discovered a new species which is described below. It belongs to the 'badiaria species-group' sensu Hausmann (2004), which so far consists of the species *R. badiaria* (Freyer, 1841), *R. bahara* Brandt, 1938, *R. vastaria* (Christoph, 1877) and, tentatively, the more distant species *R. tumulosa* Brandt, 1938, *R. iranica* Schwingenschuss, 1939 and *R. abscisaria* BRANDT 1941.

Material and conventions

Specimen data are provided as they appear on the labels. Each label from a primary type specimen is enclosed within single quotation marks; a vertical line separates lines of the label. Information enclosed by square brackets includes comments. In the text the spelling of geographical names follows the Road Map of Iran of 2005, published by Gitashenasi, Geographical & Cartographie Institute (www.gitashenasi.com). Material has been studied from the following collections (as far as included, acronyms after Evenhuis & Samuelson 2007):

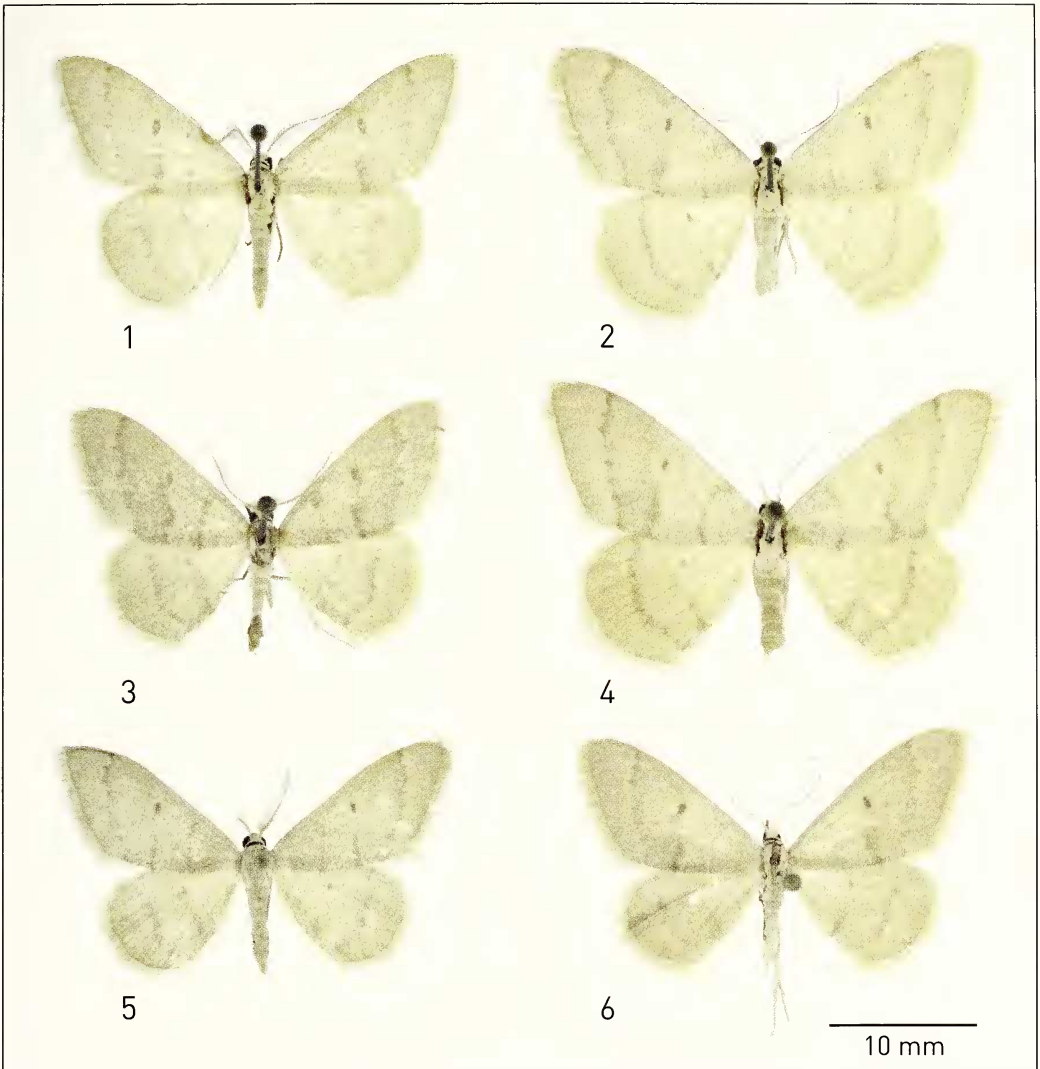
HMIM	Hayk Mirzayans Insect Museum in the Iranian Research Institute of Plant Protection (former Plant Pests and Diseases Research Institute, PPDRI), Tehran, Iran
PCJM	private collection Jörg-Uwe Meineke, Kippenheim, Germany
PCNP	private collection Norbert Pöll, Bad Ischl, Austria
SMNK	State Museum of Natural History Karlsruhe, Germany
ZIN	Zoological Institute of the National Academy of Sciences, St. Petersburg, Russia
ZSM	Zoological State Collection, Munich, Germany

Rhodostrophia tabestana sp. n.

Figs 1–11

Material. Holotype ♂: 'S-Iran, Fars, | Kaserun, Mian-Kotal | 1900 m, 11.6.1972 | Ebert & Falkner leg.', 'Holotypus ♂ | *Rhodostrophia tabestana* | det. Trusch & Hausmann 2007' [handwritten on red paper], coll. SMNK. – Paratypes (all with printed labels 'Paratypus ♂ respectively ♀ | *Rhodostrophia tabestana* | det. Trusch & Hausmann 2007' on yellow paper): 4♂, 1♂ slide no. 621/2005 Trusch, 4♀, 1♀ slide no. 620/2005 Trusch, S-Iran, Fars, Kaserun, Mian-Kotal, 1900 m, 11.6.1972; 1♂ S-Iran, Khusestan, Yassudj, Sisakht, 2250 m, 13./14.6.1972; 1♂ S-Iran, Prov. Khusestan, Yassudj, Sisakht, 50 km NW, 15.–18.6.1975; 1♂ S-Iran, Khusestan, 15 km SE Yassudj, 2050 m, 15.6.1972; 3♂, 1♀ S-Iran, Fars, 50 km NW Ardekan, Tange Surkh, 2250 m, 16.6.1972; 2♂, 1♀ id., 12.–15.6.1975; all Ebert & Falkner leg.; 1♂, 1♀ S-Iran, Khusestan, 15 km SE Yassudj, 2050 m, 15.6.1972, Ebert & Pazuki leg.; 1♂ slide no. 583/2005 Trusch, Iran, Prov. Esfahan, Zagros mts., Feridun Shar, Kamaran val., 2770 m, N 32°45', E 49°59', 11.7.2003; 1♂, 2♀ Iran, Prov. Chahar Mahal, Zagros mts. NW Samsami, 2800 m, N 32°09', E 50°11', 13.7.2003; all Ebert & Trusch leg.; 13♂ Iran, Prov. Esfahan, C-Zagros, 2600 m, 2 km NE of Semirom, 3.–4.6.2005, 2♀ Boyerahmad-va-Kohgiluyeh, SE Zagros, 35 km SE of Yasudj, 2600 m; all leg. Gyulai & Garai; 1♀ Boyer Ahmad-va-Kohgiluyeh, Yasuj E, Abnar-Region, Kakan-Baba Hasan, 2550–2800 m, 24.6.2005 [41/05], Hofmann leg.; 1♀ Fars, Yasuj E, Islamiyeh/Deshkord E, 2340–2360 m, 8.6.2005 [32/05], Hofmann & Meineke leg.; all in coll. SMNK. 1♂ Khusestan, Yassudj, Sisakht, 2250 m, 13.6.1972; 1♂ S-Iran, Khusestan, 15 km SE Yassudj, 2050 m, 15.6.1972; all Ebert & Pazuki leg.; Kohgiluyeh, Sisakht, 2100 m, 16.6.1986, Mirz.[ayans] & Hash.[emi] leg.; 3♀ Iran, Bakhtiari, 18.6.1973 [without exact locality and collector]; 1♀ Khansar, Golestan-Kuh, 2700 m, 3.–4.7.1983; 1♀ slide no. 622/2005 Trusch, Bakhtiari, Khoshab, Zardkuh, 2310 m, 6.7.1983; both Mirz.[ayans] & Brum.[and] leg.; all in coll. HMIM. 1♂ ZSM G, Genitalprp. No. 10692, 2♂, 3♀ Iran, Lorestan, 22 km E Dorud, vic. Saravand, 2300–2500 m, 33°23'N, 49°11' E, 9.–10.6.1997, Hofmann & Kautt leg., ex coll. PCNP; all in coll. ZSM. 1♂ slide no. 612/2005 Trusch, Iran, Zagros, Esfahan Umg., Feridun Shah, 2200 m, 9.7.1999, Hofmann, Meineke leg.; 2♂ Iran, Boyer Ahmad-va-Kohgiluyeh, Yasudj E, Kakan-Baba Hassan, 2600–2800 m, 8.6.2002; 1♂ Iran, Esfahan, Feridun Shahr S, Gardaneh-ye Kameran, 2900–3200 m, 16.–17.6.2002; all Meineke, Hofmann & Kallies et al. leg.; 4♂, 1♀ slide no. 623/2005 Trusch, 1♀ Iran, Chaharmahal-va-Bakhtiari, zw. Surab u. Qual-e Sorkh, 2800 m, 20.6.2001; 2♀ Iran, Chaharmahal-va- Bakhtiari, Zarde-Kuh, Samsami vic. Gardaneh-ye Cheri, 2800–3100 m, 8.–9.7.2003; 1♂ slide no. 584/2005, 1♂, 1♀ Iran, Esfahan, Semirom vic., Pashme-Kuh, 2750 m, 18.6.2001; all Hofmann, Meineke & Tremewan leg.; all in coll. PCJM. 14♂, 1♀ Iran, Lorestan, 22 km E Dorud, vic. Saravand, 2300–2500 m, 33°23'N, 49°11' E, 9./10. 6. 1997, Hofmann & Kautt leg.; all in coll. PCNP.

Description (Figs 1–6). Wingspan 26–29 mm; length of forewing 14–16 mm; females on average slightly larger in size than males. Ground colour of all wings pale ochre with dark brown suffusion. Wing pattern consists of a dark brownish discal spot on forewing and a clearly visible, slightly undulating postmedial line on fore- and hindwing. Medial



Figs 1–6. *Rhodostrophia tabestana* sp. n. **1.** Holotype ♂, South Iran, Prov. Fārs, Kāserun, Mian-Kotal, 1900 m, 11.6.1972, leg. Ebert & Falkner, SMNK. **2.** Paratype ♀, id. **3.** Paratype ♂, South Iran, Fārs, 50 km NW Ardakān, Tange Surkh, 2250 m, 16.6.1972, leg. Ebert & Falkner, SMNK. **4.** Paratype ♀, id. **5.** Paratype ♂, Iran, Prov. Boyer Ahmad-va-Kohgiluyeh, east of Yāsudj, Kakan-Baba Hassan, 2600–2800 m, 8.6.2002, leg. Meineke, Hofmann & Kallies, PCJM. **6.** Paratype ♀, Iran, Prov. Chahār Mahal, Zagros mts. NW Samsāmi, 2800 m, 13.7.2003, leg. Ebert & Trusch, SMNK.

line present on both wings but weak or absent in the costal half of the wings. Discal spot of hindwing less conspicuous than on forewing. Antemedial line slightly curved on forewing, lacking on hindwing. Underside of wings with postmedial line on both fore- and hindwing, otherwise without markings. Palpi, frons, vertex and abdomen concolorous with wing colour. Antennae of male quadripectinate, longest branches about 4.5–5 times width of flagellum. Female antennae filiform. Hindtibia of both sexes with four normal spurs. Wing venation see Fig. 7.

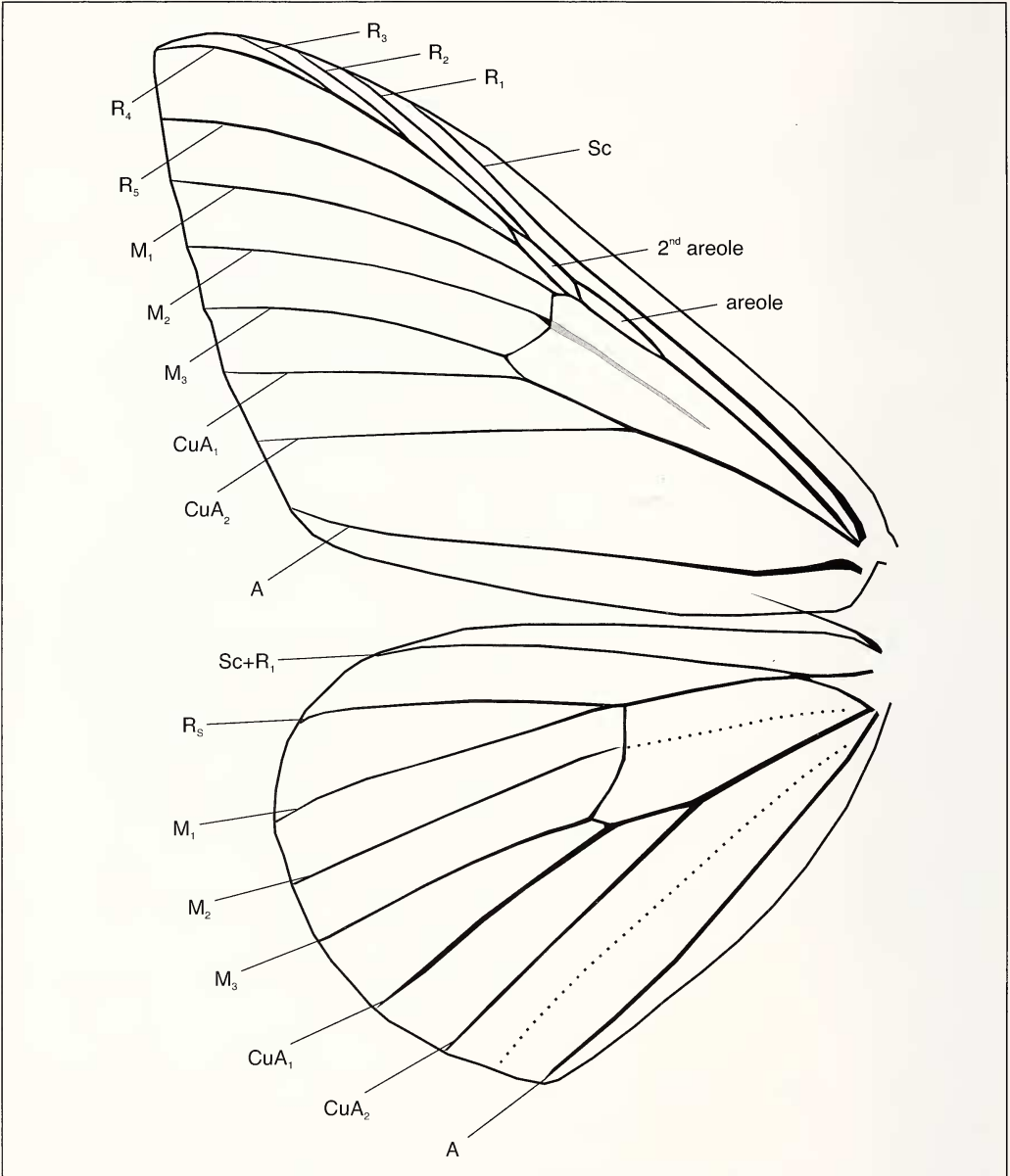


Fig. 7. Wing venation of *Rhodostrophia tabestana* sp. n.; terminology after Scoble (1995).

Male genitalia (Fig. 8). Valvae broad and rounded, slightly bilobed at tip; distal (caudad) part with numerous very small spines. Distal end of valvae somewhat truncated.

Sacculus at proximal ventral base of valvae, of rectangular shape. Uncus slender, elongated, approximately as long as diameter of the transverse ring formed by tegumen, vinculum and sacculus; distally heart-shaped. Distal half of uncus continuously dilating. Gnathos narrow, triangular, approximately half as long as uncus. Sacculus narrow,

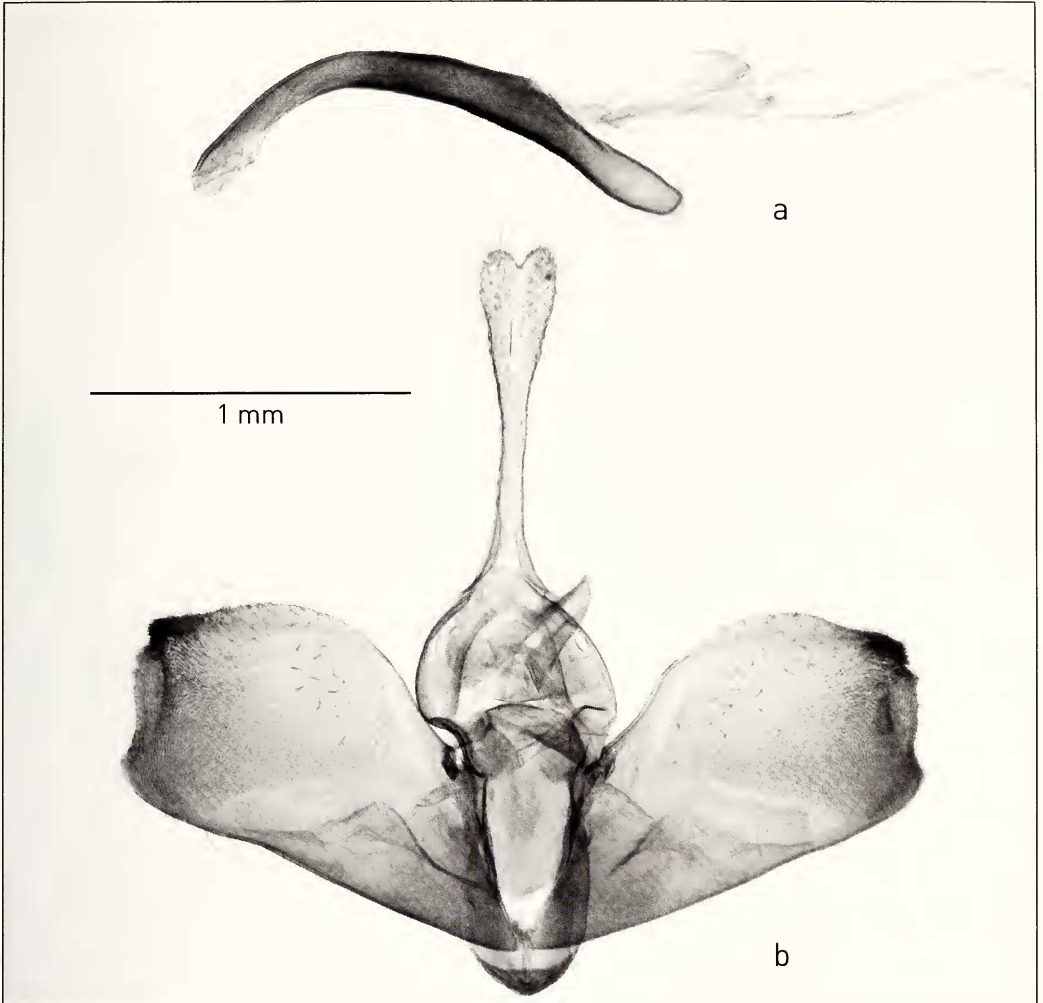
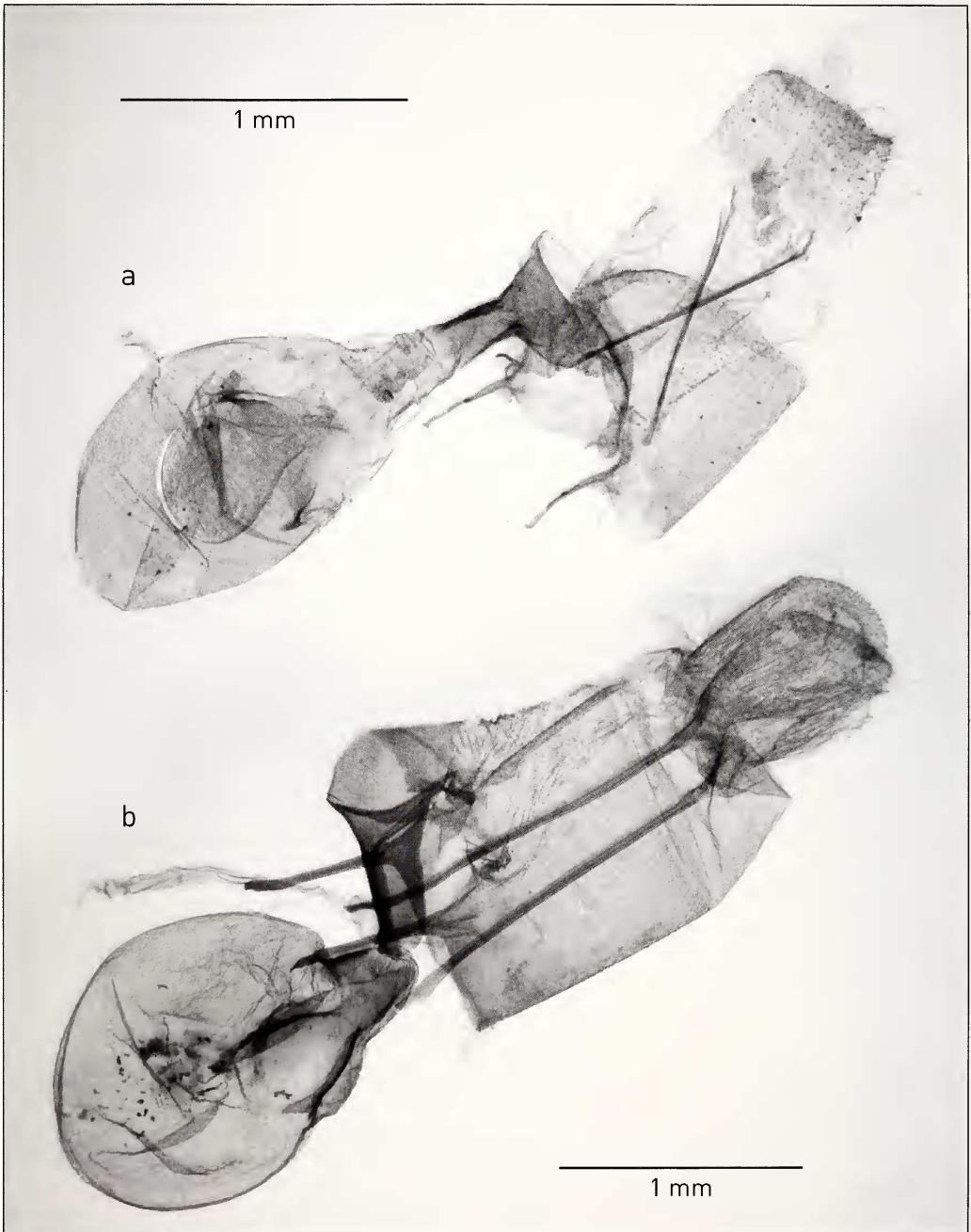


Fig. 8. Male genitalia of *Rhodostrophia tabestana* sp. n., Fereydun Shahr, Province Esfahān (slide no. 583/2005 R. Trusch), SMNK.

rounded. Juxta flat, broad, dorsad with v-shaped incision. Aedeagus curved, slender, without cornutus.

Female genitalia (Fig. 9 a). Posterior part of ductus bursae sclerotized, conical, antrum funnel-shaped, strongly dilated towards ostium bursae. Corpus bursae comparatively large, elongate oval. Signum a triangular sclerite with paired, small, tapering processes latero-anteriorly.

Distribution (Fig. 10). The species was found only in the southwest of Iran and seems to be endemic to the Zagros mountains. It occurs at altitudes between 1900 and 2900 m above sea level. The localities indicated in the map (Fig. 10) as dots are from north to south: Dorud, 2300–2500 m; Khānsār, 2700 m; Fereydun Shahr, 2770 m; Zarde Kuh area, 2310 m; Qal'eh Sorkh, 2800 m; Samsāmi, 2800 m; Semirom, 2750 m; Si Sakht, 2100 and 2250 m; Yāsuj, 2600–2800 m; Ardakān, 2250 m and Kāzerun, 1900 m.



Figs 9 a, b. Female genitalia of *Rhodostrophia* spp. **a.** *R. tabestana* sp. n.; Zarde Kuh, Iran (slide no. 622/2005 Trusch), HMIM. The pear-shaped structure inside the bursa copulatrix (corpus bursae) is a spermatophore. **b.** *R. vastaria* (Christoph, 1877), lectotype; Krasnowodsk, Turkmenistan (slide no. 624/2005 R. Trusch), ZIN.

Life history and habitat (Figs 11 a, b). Flight period from early June to mid-July; apparently univoltine. All specimens were attracted at night to artificial light and could

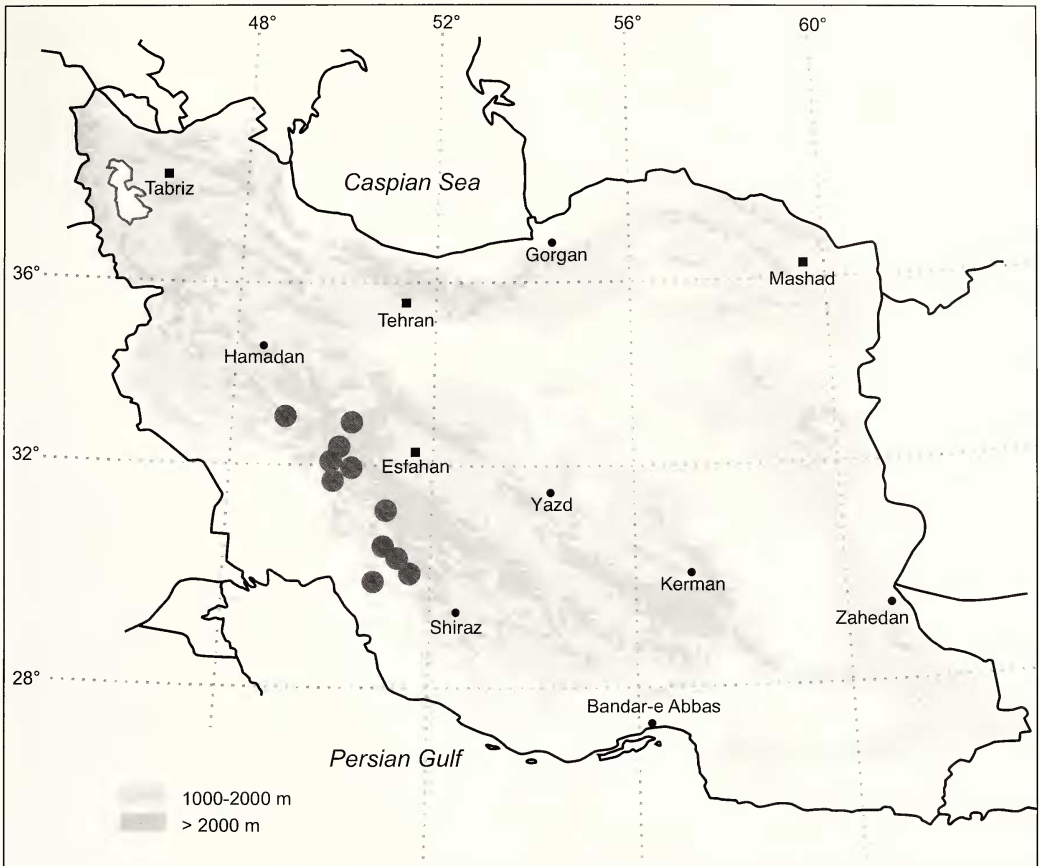
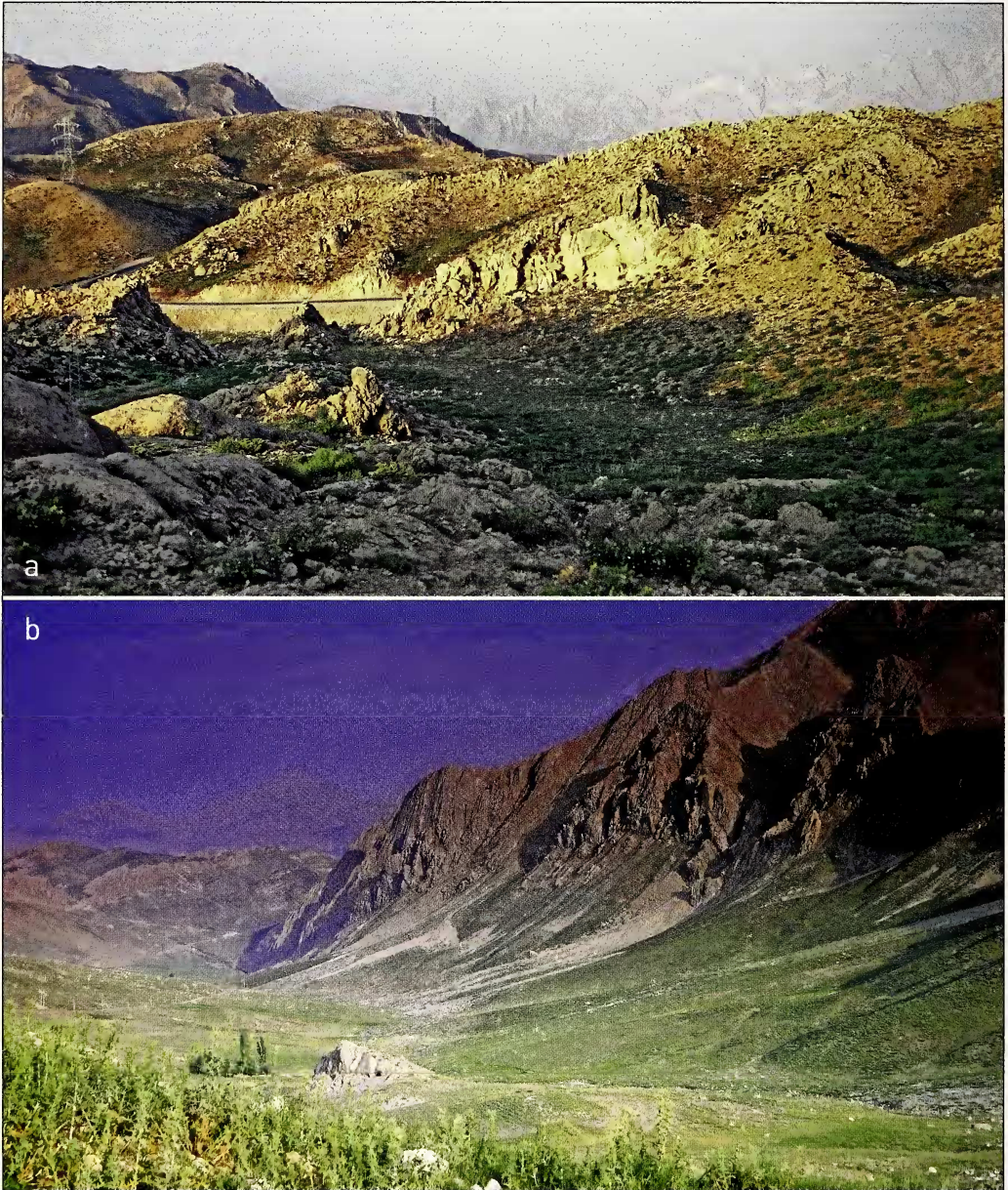


Fig. 10. Distribution of *Rhodostrophia tabestana* sp. n. (dots). The species seems to be endemic to the Zagros mountains in southwest Iran.

not be found during daytime by the senior author. The species seems to be restricted to high-mountain habitats (Figs 11 a, b). The larvae and their host plants are unknown. Occurrence of the species in different years shows no correlation between phenology and altitude.

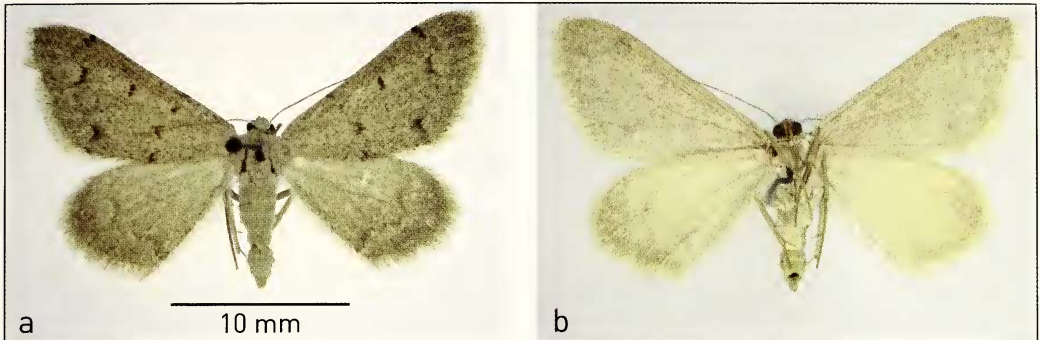
The earliest dates available to us are 3rd–4th June; several male specimens were collected at this time at an altitude of about 2600 m above sea level in the central Zagros mountains (2005; Province Esfahān, Semirom; P. Gyulai & A. Garai). Further early records are from Lorestān and Fārs, 9th and 11th June (1997; 1972), at altitudes of about 1900–2300 m. The latest records are of 13th July at altitudes of about 2800 m (2003; Province Esfahān, Kamaran valley and Province Chahār Mahal, Samsāmi; G. Ebert & R. Trusch).

Etymology. The meaning of the Farsi word ‘tābestān’ is summer. The new species occurs in the summer months June and July; *tabestana* was chosen as name for the new species, because there is another *Rhodostrophia* species in the ‘*badiaria* species-group’ in Iran, *R. bahara* Brandt, 1938, flying in April and May. The meaning of the Farsi word ‘bahār’ is spring.



Figs 11 a, b. Habitats of *Rhodostrophia tabestana* sp. n. in the Zagros mountains, central Iran. **a.** Gardaneh-ye Cheri (Cheri-pass) near Samsāmi (photo Trusch, 14.7.2003); **b.** the west-east orientated Kamaran valley near Fereydun Shahr (photo Ebert, 12.7.2003). In both places the new species was attracted to artificial light at night. All accessible areas are used by the Bakhtiyari nomads as summer-pastures. The localities show very strong traces of overgrazing, herbs are nearly invisible. Conspicuous plants left were *Daphne* sp. (Thymelaceae), *Astragalus* spp. (Fabaceae), *Phlomis* spp. (Lamiaceae), *Eryngium* spp. (Apiaceae) and thistles (Asteraceae).

Differential diagnosis and discussion. Wing colour of the new species ochre with a slight orange tinge, whilst fresh specimens of the other relatives of the '*badiaria* species-



Figs 12 a, b. Lectotype of *Eusarca vastaria* Christoph, 1877; photo before dissection. Labels: ‘13/5’, ‘Krasnowodsk’, ‘ex mater. Mus. Acad. Petrop.’, ‘coll. Erschov.’, ‘GU: 624/2005 R. Trusch’, ‘Lectotypus ♀, *Eusarca vastaria* Christoph, 1877, design. Trusch & Hausmann’, ZIN; **a.** upper side; **b.** underside.

group’ have greyish ground colour, fading to light brown in old collection specimens. Sister species relationship is supposed between the new species and *R. vastaria* (Figs 12 a, b); the type material of the latter is investigated here, see below.

Rhodostrophia tabestana sp. n. is slightly larger than *R. vastaria* (Figs 12 a, b; see also Hausmann 2004: pl. 22, Fig. 174f), forewing length of the latter measuring approx. 13 mm; wings narrower. Transverse lines in *R. vastaria* less marked; the more diffuse wing pattern being largely restricted to the dark forewing discal spots and to darker shadows at the post- and antemedial lines. Medial line of forewing entirely absent, not marked at inner termen as in the new species. Base of hindwing whitish, darkened towards outer margin, transverse lines usually absent on hindwing.

Male genitalia of *R. vastaria* are figured in Hausmann (2004: 521, Fig. 174b); with aedeagus less curved and broader at tip, cornutus present; tip of valva more spinose and more projecting ventrally. Female genitalia of *R. vastaria* (Fig. 9 b) approx. $\frac{1}{4}$ larger than in the new species, with band-shaped, paired signa, connected to the sclerotized ductus bursae, not small and isolated in the centre of the bursa; apophyses posteriores longer than in the new species. Contrary to *R. tabestana* sp. n. which flies in midsummer, *R. vastaria* is a lowland spring species on the wing in May.

***Rhodostrophia vastaria* (Christoph, 1877)**

Figs 9 b, 12 a, b

Eusarca vastaria Christoph, 1877: 261, pl. 7 figs 31–32.

Material. Lectotype (hereby designated in order to stabilize nomenclature): ‘13/5’, ‘Krasnowodsk’ [most probably in the hand writing of Hugo Christoph; Mironov in litt. 2006], ‘ex mater. Mus. Acad. Petrop.’, ‘coll. Erschov.’ [the latter both printed on white paper], ‘GU: 624/2005 | R. Trusch’, ‘Lectotypus ♀ | *Eusarca vastaria* | Christoph, 1877 | design. Trusch & Hausmann’ [handwritten on red paper] in coll. ZIN. – Paralectotype (examined): ‘11/5’, ‘Krasnowodsk’ [hand writing, see above], ‘ex mater. Mus. Acad. Petrop.’, ‘coll. Erschov.’ [the latter both printed on white paper], ‘Paralectotypus ♀ | *Eusarca vastaria* | Christoph, 1877 | design. Trusch & Hausmann’ [printed on yellow paper] in coll. ZIN.

The type material of *R. vastaria* was examined to compare the new species with its supposed closest relative. Of the male and female syntypes mentioned in the original description only two females could be traced at the ZIN. Christoph described *Eusarca*

vastaria after his visits to Krasnovodsk (today “Turkmenbaschi”, Turkmenistan) on the east coast of the Caspian Sea in the spring of 1872 and 1874, from the “sandy steppes near Krasnovodsk in May” (Christoph 1877: 181, 261).

For habitus, male and female genitalia (Figs 9b, 12 a, b), see differential diagnosis of *R. tabestana* sp. n.

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